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## THE SPECIFIC CHARACTERS OF ERAGROSTIS PEREGRINA AND ITS TWO ALLIES.

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HACKEL based his *Eragrostis pilosa* var. *condensata*<sup>1</sup> upon a weed occurring in the Grand-Ducal Palace Garden at Karlsruhe. When Professor K. M. Wiegand renamed this plant *E. peregrina*<sup>2</sup> in 1917 he had material from eight stations. In a recent article on the occurrence of the species about Philadelphia<sup>3</sup> it was noted as frequent in this region and more than thirty-five stations for it were mentioned. The greater number of these records are supported by copious suites of material, mostly collected during 1917. In the past season a goodly number of additional collections have been made, especially by Mr. Harold W. Pretz in Lehigh County, Pennsylvania. In consequence there have accumulated at Philadelphia some hundreds of specimens from more than fifty stations. Because of this abundant material now at hand—much more than previously has been available in any study of this plant—a favorable opportunity has arisen to amplify or, in some cases, to reconsider the characters advanced by Hackel and the additional ones noted by Professor Wiegand, as well as to weigh their critical comments.

The affinities of this plant, it may be well to recall, lie with *E. Purshii* as well as *E. pilosa*. There has been a failure among many American botanists in rather recent years to separate the two latter species, but a preliminary study several years ago indicated that these

<sup>1</sup> Hackel, *Allgem. Bot. Zeitschr.* vii. 13 (1901).

<sup>2</sup> Wiegand, *RHODORA*, xix. 93 (1917).

<sup>3</sup> Long, *RHODORA*, xx. 173 (1918).



two plants could be separated with a marked degree of success. With the present interest in *E. peregrina*, a comparative study of the three plants was undertaken— not only because of the previous conviction of the distinctness of *E. Purshii* but particularly because of a number of exceptions noted by Professor Wiegand in his discussion of the distinguishing character of *E. peregrina*. Hackel had compared his plant chiefly with *E. pilosa* but he also distinguished it from *E. Purshii*. Professor Wiegand on the other hand, including *E. Purshii* in *E. pilosa*, compared his *E. peregrina* with a much more complex species-group. It was suspected that the breaking down of certain characters through exceptions was alone due to the failure to distinguish *E. Purshii*. With a further study of the group these exceptions were found to clear away and *E. peregrina*, as well as *E. Purshii*, to stand free from *E. pilosa*.

The characters of *Eragrostis peregrina* compared with those of *E. pilosa* and *E. Purshii*, critical comments, and certain observations apparently new may be taken up in the general sequence of a detailed description.

Of the most constant differences, the greatest stress is rightly laid by Professor Wiegand upon the absence of the long hairs on the auricles of the sheath. A slight delimitation of this character, apparently, should be made. The condition would seem to be more accurately described, if the absence of the hairs be noted on, say, the upper sheaths — the lower sheaths and those on short sterile branches are very often supplied with well developed auricular hairs. This possibly somewhat technical observation in no way depreciates the value of this important character brought to light by Professor Wiegand.

The distinguishing character of the solitary branches of the panicle, maintained by Hackel, is to be given critical consideration. That the panicle-branches of *E. peregrina* are solitary and those of *E. pilosa* in 2's or 4's in the strict sense does not seem to be borne out by a series of specimens, but there is here the germ of a very excellent diagnostic character. In the examination of several hundreds of specimens from many different stations it has been noted that the base of the panicle in *E. peregrina* is consistently composed of a single branch, its point of origin well differentiated from the branch next above, while in *E. pilosa* it is characteristically a pair or a whorl of branches. In *E. Purshii* a somewhat intermediate condition seems to



exist — either single or opposite branches at the base of the panicle. Professor Wiegand notes that “The branches of the panicle . . . are sometimes solitary in smaller forms of *E. pilosa* (including *E. Purshii*).” These forms are probably *E. Purshii*, not true *E. pilosa*. But it will be agreed, doubtless, that the value of a character so palpably dependent upon normal growth need not be discounted by casual small forms.

The absence of the hairs in the axils of the panicle-branches appears to be perfectly constant in *E. peregrina* and therefore diagnostic for the species. Hackel notes that they are, however, sometimes absent in *E. pilosa*; the same is to be said of *E. Purshii*: hence this character must be valued accordingly.

Hackel's statement that in *E. peregrina* “the branches of the panicle are spikelet-bearing to the base so that the panicle appears much denser” while in *E. pilosa* they are “branched from the one-third or one-half point upward and loosely provided with spikelets” describes the condition in these two species perhaps sufficiently accurately, but Professor Wiegand's phrasing, in the case of *E. peregrina*, “spikelet-bearing to near the base,” is certainly preferable. Professor Wiegand's comment, . . . “*E. pilosa* (including *E. Purshii*) . . . in smaller plants of the latter species the spikelets extend far toward the base of the branches,” was apparently induced by his comparison with plants of true *E. Purshii*. This last species rather characteristically has spikelets arising from quite near the bases of the branches. This character technically distinguishes *E. peregrina* from *E. pilosa* but not from *E. Purshii*. Another point: *E. Purshii* as well as *E. pilosa* having open, sparse panicles, obviously the denseness of the panicle in *E. peregrina* is not alone due to the panicle-branches being spikelet-bearing to the bases, as Hackel seems to infer. The point to be noted is that the panicle of *E. peregrina* bears up to five or more times as many spikelets as either of its allies. When a numerical character becomes as tangible as in this case, it assumes as much importance, it is believed, as is commonly accredited the number of florets in a spikelet in this genus.

The spikelets show characters of more or less differentiating value. The shape appears to be rather distinctive. In *E. peregrina* it is characteristically ovate or ovate-oblong; in *E. Purshii*, ovate-lanceolate; in *E. pilosa*, tending to be linear. In the width of spikelet *E. peregrina* is practically indistinguishable from *E. Purshii* but rather



readily separable from *E. pilosa*; the spikelets in the first two are ordinarily about 1.5 mm. wide; in the last, about 1.0 mm. In such closely allied species the length of the spikelet and the number of florets in a spikelet may not be expected to furnish very tangible points of difference. Furthermore considerable variation is found in different colonies of the same species, in different individuals of the same colony and in spikelets of different age upon the same plant.<sup>1</sup> However, it can readily be shown that a tendency to increase of length and number of florets runs from *E. peregrina* through *E. pilosa* to *E. Purshii*. The spikelets in *E. peregrina* are characteristically well under 5. mm. (and rarely if ever over that length); in *E. pilosa*, somewhat tending to exceed 5. mm.; in *E. Purshii*, rather frequently well over 5. mm. A similar ratio of increase occurs in the number of florets: in *E. peregrina* commonly under 10; in *E. pilosa*, occasionally over 10, up to about 12; in *E. Purshii*, frequently over 10, at times as many as 15.

It is to be maintained that the very short pedicels of *E. peregrina* constitute an excellent diagnostic character, liable to very little if any confusion from supposed short pedicels in *E. pilosa*. In dimensional characters of this kind it is commonly no difficult task to pick out individual cases that would seem to show the given measurements to be of little value. But in the present instance it may be confidently asserted that with experience this character will be recognized as of the greatest service. It immediately distinguishes *E. peregrina* from *E. Purshii*, which latter species commonly has quite long pedicels — in fact from several to many times longer.

The character of smooth empty glumes may be reapportioned among the three species. They are characteristically quite smooth in *E. peregrina* but Professor Wiegand further notes that in *E. pilosa* they are usually but not always scabrous on the keel. This latter statement is to be connected with the inclusion of *E. Purshii* in *E.*

<sup>1</sup> The spikelets of all three species are subject to a notable reduction in length and number of florets in the later panicles. This seems to be most marked in *E. peregrina*. When bearing short spikelets of rather few florets *E. peregrina* will appear to almost assume the key-characters commonly used for *E. Frankii*. In fact, in general appearance — size of plant, habit of growth, many-flowered panicle with stiff, spreading branches — it often bears a greater likeness to this species than to either *E. pilosa* or *E. Purshii*. When the ripe grains are protruding from the spreading scales, in plants showing this marked reduction, *E. Frankii* is so strongly simulated that at a distance it is no slight task to distinguish the two with accuracy. Professor T. C. Porter, as shown by his own determinations, consistently referred the plant to *E. Frankii*.



*pilosa*. It appears that *E. pilosa* has essentially smooth empty glumes while a scabrous keel seems to be a very excellent index of *E. Purshii*. Good characters are also to be found in the actual and relative dimensions of the empty glumes. In *E. peregrina* the lower empty glume is very much reduced, measuring only about 0.5 mm. in length; the upper, about 1.0 mm. About the same condition occurs in *E. pilosa* but some variability is present. In *E. Purshii* the lower measures about 1.0 mm. and the upper about 1.5 mm. The minute lower empty glume will constantly differentiate *E. peregrina* (and usually *E. pilosa*) from *E. Purshii*.

That "the florets are . . . somewhat smaller," as Professor Wiegand observes, would appear to belong to the comparison with *E. Purshii*. There appears to be little tangible difference between those of *E. peregrina* and *E. pilosa* but the rather larger florets of *E. Purshii* will be appreciated with a little experience. Dimensionally the former two species may be said to have florets usually under 1.5 mm. in length; the latter, commonly over 1.5 mm.

Professor Wiegand, in commenting upon the statement of Hackel that "The plant is closely related to the *E. Purshii* (*caroliniana*) but is distinguished from it by the absence of conspicuous lateral nerves on the flowering glume," says, "The lateral nerves of the flowering glumes are always inconspicuous but there are occasional specimens of *E. pilosa* in which they are equally indistinct." My own observations indicate that, as in other characters, *E. peregrina* shows itself to be very closely related technically to *E. pilosa*, and in the matter of distinctness of the lateral nerves very little if any differentiation can be drawn between these two species, but *E. Purshii* may be separated from them both, with a fair degree of satisfaction, by its quite conspicuous nerves. Professor Wiegand's observation, one may believe, is due to the abundant material of *E. Purshii* which he had for comparison and the relatively small series of real *E. pilosa*—if the material at Cambridge and New York runs similar to that at Philadelphia.

The use of texture and color of the flowering glumes by some authors as key characters to separate *E. pilosa* and *E. Purshii* induced a comparative examination of these features in the three species. At best, characters of this kind do not seem overly distinctive. In the present case very little satisfaction is obtained in endeavoring to distinguish between "thin" and "firm," and "purplish," whether



“bright” or “dull.” It seems practically impossible to differentiate textures and the best that can be said of the coloring is that *E. pilosa* and *E. peregrina* seem to have a greater tendency to be somewhat “purplish” tinged than *E. Purshii*. It seems very doubtful if there is any real value in these points — certainly none to distinguish readily *E. peregrina*.

A distinction, apparently not previously noted, is to be found in the behavior of the paleas on the maturity of the grain. It is well known that in *Eragrostis* the paleas are often persistent after the fall of their lemmas but this point does not seem to have been used very extensively (or possibly found constant) as a diagnostic character. In the course of field study embracing mostly *E. Purshii* and *E. peregrina* it became apparent that in the former the paleas are very persistent and tightly appressed to the rachilla, even after the panicle has become completely dead and broken up. A very characteristic appearance is produced, somewhat suggesting a shriveled or desiccated spikelet. On the other hand it was found that in *E. peregrina* all the scales, including the paleas, immediately fall away with the ripened grain from the rachilla. The denuded, close, short zigzag of the rachilla proves to be a character of considerable value. It is not to be supposed, of course, that *every* palea *always* falls away but the tendency is so very strong that if a mature panicle be pulled through the fingers any paleas still attached will invariably break away at once, showing their natural disarticulation. This process applied to *E. Purshii* rarely if ever disturbs a single palea. It has not been possible to examine satisfactorily the behavior of the paleas in *E. pilosa*, as field experience with this species has been too meager to be conclusive, but it would appear that the paleas are more or less deciduous. In *E. peregrina* and *E. Purshii* this point is definite and distinctive but in *E. pilosa* herbarium material suggests it to be a variable character.

Of differences almost microscopic, but apparently distinctive in a way, the size of the grain may be noted. That of *E. peregrina* is the smallest, measuring about 0.5–0.6 mm. in length. That of *E. pilosa* and of *E. Purshii* averages about 0.7–0.8 mm. These measurements are too minute and too close to be of much practical service — particularly when some variation must be allowed for spikelets of different ages.

It might seem from a critical examination of the foregoing comments



that, while *E. Purshii* has been separated from the group with some satisfaction, *E. peregrina* has been almost comprehended in *E. pilosa*. And, truth to tell, its relationship, on a majority of points, does lie more nearly with *E. pilosa*, but in the possession of several constant and unique characters it amply proves itself specifically distinct from both its allies.

The characters of *E. peregrina* may be briefly summarized. The most distinctive, separating the plant from both *E. pilosa* and *E. Purshii*, would appear to be: absence of auricular hairs on the upper sheaths; panicle densely flowered, bearing a great number of spikelets; spikelets ovate or ovate-oblong; pedicels of the spikelets very short. Of scarcely less value are those characters which are constant for *E. peregrina* but shared by one or the other of its allies — or both, in the single case of absence of hairs in the axils of the panicle branches. Among these may be noted: base of the panicle consisting of a single branch; absence of hairs in the axils of the panicle-branches; branches of the panicle spikelet-bearing to near the base; spikelets about 1.5 mm. wide; empty glumes with smooth keels, the lower one about 0.5 mm. long; florets small, usually under 1.5 mm. in length; lateral nerves of the flowering glumes inconspicuous; paleas deciduous.

Similarly, the most salient characters separating *E. pilosa* from its two allies seem to be: panicle-branches branched from the one-third to the one-half point upward; spikelets tending to be linear, about 1.0 mm. wide. Characters constant for the species but shared by *E. peregrina* or *E. Purshii*: auricles of the sheaths bearing long hairs; base of the panicle a pair or a whorl of branches; panicle sparsely flowered; pedicels of the spikelets long; empty glumes with smooth keels, the lower one about 0.5 mm. long; florets small, usually under 1.5 mm. in length; lateral nerves of the flowering glumes inconspicuous.

For *E. Purshii* the two categories of characters may be noted in like manner. First: spikelets ovate-lanceolate; empty glumes with scabrous keels, the lower one about 1.0 mm. long; florets larger, usually over 1.5 mm. in length; lateral nerves of the flowering glumes conspicuous; paleas persistent. Second: auricles of the sheaths bearing long hairs; branches of the panicle spikelet-bearing to near the base; panicle sparsely flowered; pedicels of the spikelets long; spikelets about 1.5 mm. wide.

It is not to be thought that in the distinguishing of *E. pilosa*, *E.*



*Purshii* and *E. peregrina* the difficulties surrounding this group have been removed. It is believed that they are in part ameliorated, but while *E. peregrina* and *E. Purshii* appear to be very definite species units, each quite constant in its characters, the same cannot so certainly be said of *E. pilosa*. In fact the amount of variation seen in the material grouped together under *E. pilosa* is so much more pronounced than in the two allied species that it is strongly suspected this is by no means a homogeneous series. *E. Purshii* has proved to be so satisfactorily separable, despite critical opinion to the contrary, that one is naturally inclined to a belief that this is a group still deserving careful study.

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## A NEW POLYGONUM FROM SOUTHEASTERN MASSACHUSETTS.

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IN 1913, while exploring the ponds of Plymouth, Massachusetts, with Messrs. Francis W. Hunnewell and Bayard Long, the writer was much interested in a strictly indigenous annual *Polygonum* of the sandy pond-margins which was obviously related to the naturalized *P. Persicaria* L. but which had more slender and more richly colored spikes. Although it was obvious that this indigenous plant of southeastern Massachusetts could not be exactly matched by *P. Persicaria*, no serious attempt was made to differentiate the two until further observations could be made. It is noteworthy, however, that in 1915, Mr. C. A. Weatherby, collecting the plant of "sandy strand of a pond" on Cape Cod, should have labeled his material "*Polygonum Persicaria* L.?" In 1918 the real opportunity to watch the plant came when the writer spent the summer on Cape Cod with side-trips into Plymouth. In this exploration he was accompanied most of the time by Mr. Long and the native *Polygonum* was found to be universally distributed on the Cape, and everywhere a plant strictly of pond-margins. The ubiquitous weed, *P. Persicaria*, with its duller pink spikes, was naturally abundant near houses and about the farms, and the indigenous plant held its own peculiar differences